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EXAMINER	
LAVIN, CHRISTOPHER L	
ART UNIT	**PAPER NUMBER**
2621	

DATE MAILED: 07/01/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/045,651	GANOT ET AL.	
	Examiner	Art Unit	
	Christopher L. Lavin	2621	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *07 November 2001*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-55* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-55* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *07 November 2001* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 5/30/02; 8/15/02; 10/11/02; 10/27/02; 2/10/03; 6/5/03; 10/24/03
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. The drawings are objected to because every numbered item that would not be readily identified by one skilled in the art also requires a text label. For example Figure 3, has dozens of numbered items, many of which are not readily identifiable by the examiner and therefore require text labels. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1 and 2 are rejected under 35 U.S.C. 102(e) as being anticipated by Taff (6,165,658).

In regards to claim 1, A method for aligning an image to be recorded by a direct image scanner on an upper layer of a printed circuit board with an image recorded on a lower layer thereof, the method comprising: visually imaging a portion of the image on the lower layer (col. 10, lines 5 – 11: The conductive sites are vias.); and recording a pattern on the upper layer, referenced to coordinates of the visual image of the portion (col. 10, lines 30 – 35; col. 10, lines 47 – 50: The upper layers pattern is modified in reference to the lower layer's image and then recorded on the layer.).

In regards to claim 2, A method according to claim 1 wherein the portion is an alignment pattern recorded on the lower layer (col. 8, lines 46 – 67: The vias are on the lower layer.).

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –

> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claim 27 is rejected under 35 U.S.C. 102(b) as being anticipated by Berasi (5,170,058).

In regards to claim 27, A method of image alignment, comprising: producing an array of elements arranged in a non-periodic pattern on said image (col. 4, lines 30 – 39; col. 4, line 53 – col. 5, line 15: One dots or two dots are both non-periodic patterns.); and matching said pattern with an identical pattern, such that said image is aligned when the patterns overlay each other, wherein fewer than 50% of the elements of the alignment pattern in the image overlay the pattern in the identical pattern for any position in which the patterns are not aligned (col. 4, lines 30 – 39; col. 4, line 53 – col. 5, line 15: If only one dot is aligned, i.e., 50%, the pattern is not aligned. Both dots need to be aligned for the patterns to be aligned.).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.

3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

8. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

9. Claims 5 – 26, 28 – 55 are rejected under 35 U.S.C. 103(a) as being unpatentable over Taff in view of Lichtenstein.

In regards to claims 5 – 7, Taff discloses a method for aligning and printing multi-layer circuit boards. Taff focuses on the necessary realigning needed to perform proper registration between multi-layer boards. Taff implies, but does not directly discuss how the actual patterns are printed. So another reference from the same assignee (Creo Ltd) has been applied to Taff, this reference appears, based on the similarity of the specifications and drawings, to be the approach taken by Taff for printing the patterns on the upper layer.

Taff discloses (col. 10, lines 24 – 35) that based on the imaged portion from the lower layer the positions of the holes are repositioned to correspond to the imaged portion.

Lichtenstein teaches (Figures 13 and 14; col. 11, lines 55 – col. 12, line 8) that first holes are drilled into a substrate. The holes are then imaged; the locations of the holes are then used to align the pattern on the substrate.

Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to use the printing steps disclosed by Lichtenstein in the multi-layer aligning method disclosed by Taff. Lichtenstein's method would allow for patterns to be more accurately placed on the substrate, which would thus require less correction for the next layer.

In regards to claim 8, A method according to claim 6 wherein the holes comprise holes that do not pass through the lower layer (Taff: col. 14, lines 29 – 34: Vias do not need to pass through the lower layer to connect the two layers.).

In regards to claim 9, A method according to claim 6 wherein the holes are vias (Taff: col. 14, lines 29 – 34: Conductive connecting sites are vias.).

In regards to claim 10, A method according to claim 9 wherein the holes comprise functional vias connecting patterns on the upper and lower layers (Taff: col. 14, lines 29 – 34).

In regards to claim 12, A method according to claim 6 wherein the holes pass through the upper and lower layers (Taff: col. 14, lines 29 – 34: As Taff is disclosing an alignment method for multiple boards a through hole or via might need go through both the upper and lower layers.).

In regards to claim 13, A method according to claim 6 wherein the holes form an alignment pattern, referenced with the image on the lower layer (col. 10, lines 24 – 35).

In regards to claims 11, 14 and 15, Taff discloses that second layer can be comprised of any feature and as already shown Taff includes through holes which go through both layers. However Taff does not specifically state that holes having no electrical function can be placed on the layer. Lichtenstein teaches (col. 7, lines 43 – 55, col. 8, lines 11 - 19) that holes having no electrical function can be used for the purposes of aligning a pattern.

Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to include holes having no electrical function (as taught by Lichtenstein in the method disclosed by Taff. As Lichtenstein teaches alignment holes allows for the proper alignment of boards, thus leading to more accurately placed patterns which, when dealing with multi-layer boards, is crucial for successful manufacture.

In regards to claim 16, claim 16 is rejected for the same reasons as claim 8. The argument analogous to that presented above for claim 8 is applicable to claim 16.

In regards to claim 17, claim 17 is rejected for the same reasons as claim 6. The argument analogous to that presented above for claim 6 is applicable to claim 17.

In regards to claim 18, The method for recording an image according to claim 17 and wherein forming at least one hole comprises forming at least one hole with a laser micro-machining device (Taff: col. 19, lines 4 – 10).

In regards to claim 19, claim 19 is rejected for the same reasons as claim 8. The argument analogous to that presented above for claim 8 is applicable to claim 19.

In regards to claim 20, The method for recording an image according to claim 17 and wherein acquiring an image includes acquiring a digital image of the at least one hole (Lichtenstein: col. 12, lines 32 – 45).

In regards to claim 21, The method for recording an image according to claim 17 and wherein calculating a location of the at least one hole from analysis of the image comprises calculating a location of the at least one hole in a coordinate system of an image recording system (Lichtenstein: col. 12, lines 32 – 45).

In regards to claim 22, The method for recording an image according to claim 17 and wherein recording a pattern comprises photosensitizing said upper layer and scanning a pattern onto the upper layer with a laser direct imaging system (Taff: col. 54 – 59).

In regards to claim 23, The method for recording an image according to claim 17 and wherein recording a pattern comprises photosensitizing said upper layer and imaging a pattern onto the upper layer through a mask (Taff: col. 13, lines 35 – 39: Using a mask to record a circuit pattern is well known in the art.).

In regards to claim 24, A method according to claim 17 wherein said at least one hole a plurality of holes arranged in a non-periodic hole pattern (Taff: col. 14, lines 29 – 34: The holes in an electrical circuit are often in a non-periodic hold pattern.).

In regards to claim 25, claim 25 is rejected for the same reasons as claim 8. The argument analogous to that presented above for claim 8 is applicable to claim 25.

In regards to claim 26, claim 26 is rejected for the same reasons as claim 12. The argument analogous to that presented above for claim 12 is applicable to claim 26.

In regards to claim 28, claim 28 is rejected for the same reasons as claim 6. The argument analogous to that presented above for claim 6 is applicable to claim 28.

In regards to claims 29 and 30, wherein micro machining device is a laser drill (Taff: col. 9, lines 54 – 59).

In regards to claim 31, Apparatus for recording an electrical circuit pattern according to claim 28, and wherein said alignment pattern is defined by a plurality of holes in said upper surface (Lichtenstein: Figures 13 and 14; col. 11, lines 55 – col. 12, line 8).

In regards to claim 32, Apparatus for recording an electrical circuit pattern according to claim 31, and wherein said plurality of holes is arranged in a non-periodic pattern (Taff: col. 14, lines 29 – 34: The holes in an electrical circuit are often in a non-periodic hold pattern.).

In regards to claim 33, claim 33 is rejected for the same reasons as claim 8. The argument analogous to that presented above for claim 8 is applicable to claim 33.

In regards to claim 34, Apparatus for recording an electrical circuit pattern according to claim 33, and wherein said plurality of micro-machined holes is arranged in a non-periodic pattern (Taff: col. 14, lines 29 – 34: The holes in an electrical circuit are often in a non-periodic hold pattern.).

In regards to claim 35, Apparatus for recording an electrical circuit pattern according to claim 28, and wherein said alignment pattern is defined by a plurality of objects deposited on said upper surface, said objects being arranged in a non-periodic

pattern (Taff: col. 14, lines 29 – 34: The holes in an electrical circuit are often in a non-periodic hold pattern. Holes can be objects).

In regards to claim 36, Apparatus for recording an electrical circuit pattern according to claim 35, and wherein said plurality of objects is a plurality of markings (Taff: col. 14, lines 29 – 34: Holes are markings.).

In regards to claim 37, Taff discloses using holes are markings. Taff however does not disclose dimples. Lichtenstein, however, teaches (col. 7, lines 52 – 56 as shown in figure 7, items 34 and 35) that dimples, holes not going through the layer, can be used for alignment markings.

Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to use dimples (as taught by Lichtenstein) in the method disclosed by Taff. A camera can easily identify dimples, but don't require a complete hole to be placed in a board. Every hole takes up both sides of the board thus reducing space on the opposite side of the board. Dimples don't take up space on the opposite side. Thus dimples save space, which is often incredibly valuable in circuit design.

In regards to claim 38, Apparatus for recording an electrical circuit pattern according to claim 28, and wherein said an alignment pattern location sensor comprises a digital camera and an image processing circuit operative to acquire an image and compute a location of said alignment pattern (Lichtenstein: Figure 4, items 11 and 15).

In regards to claim 39, Apparatus for recording an electrical circuit pattern according to claim 38, and wherein said location of said alignment pattern is computed

in a coordinate system employed by said electrical circuit pattern generator (Lichtenstein: col. 12, lines 32 – 45).

In regards to claim 40, Apparatus for recording an electrical circuit pattern according to claim 39, and wherein said upper layer includes a photosensitized surface and said electrical circuit pattern generator is a laser direct imaging scanner selectively recording an electrical circuit pattern on said photosensitized surface (Taff: col. 54 – 59).

In regards to claim 41, Apparatus for recording an electrical circuit pattern according to claim 39, and wherein said upper layer includes a photosensitized surface and said electrical circuit pattern generator comprises a phototool mask and a light projector projecting light through said phototool mask onto said photosensitized surface to selectively record an electrical circuit pattern thereon (Taff: col. 13, lines 35 – 39: Using a mask to record a circuit pattern is well known in the art.).

In regards to claims 42 – 44, claims 42 – 44 are rejected for the same reasons as claim 31. The argument analogous to that presented above for claim 31 is applicable to claims 42 – 44.

In regards to claim 45, claim 45 is rejected for the same reasons as claim 32. The argument analogous to that presented above for claim 32 is applicable to claim 45.

In regards to claim 46, claim 46 is rejected for the same reasons as claim 33. The argument analogous to that presented above for claim 33 is applicable to claim 46.

In regards to claim 47, Apparatus for recording an electrical circuit pattern according to claim 42, and wherein said alignment pattern is defined by a plurality of

holes through said multi-layered printed circuit board substrate (Taff: col. 14, lines 29 – 34: As Taff is disclosing an alignment method for multiple boards a through hole or via might need go through both the upper and lower layers.).

In regards to claim 48, Apparatus for recording an electrical circuit pattern according to claim 47, and wherein said plurality of holes is arranged in a non-periodic pattern (Taff: col. 14, lines 29 – 34: The holes in an electrical circuit are often in a non-periodic hold pattern.).

In regards to claims 49 – 55, claims 49 – 55 are rejected for the same reasons as claims 35 – 41. The argument analogous to that presented above for claims 35 – 41 is applicable to claims 49 – 55.

10. Claims 3 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Taff in view of Waldner (5,643,699).

In regards to claims 3 and 4, Taff as previously shown images the lower board to align the upper board with this image. Taff however does not disclose that the lower board is imaged through the upper board.

Waldner discloses (col. 2, line 45 – col. 3, line 7) that two surfaces can be aligned by imaging a pattern on the lower surface through upper surface by using holes in the upper surface.

Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to align two surfaces by imaging the lower surface through the upper surface (as taught by Waldner) in the aligning method disclosed by Taff. Waldner teaches that aligning two surfaces with the technique disclosed allows for "a more exact

position[ing]". The more exacting the alignment is the less correction Taff will need to make to the subsequent layers.

Conclusion

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

12. US. Pat. 5,963,781 discloses aligning a substrate by cutting a hole into it to visualize an alignment pattern on a lower layer.

13. US. Pat. 5,388,517 discloses using two non-periodic patterns to align two layers.

14. US. Pat. 6,268,920 discloses using two non-periodic patterns to align layers.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christopher L. Lavin whose telephone number is 571-272-7392. The examiner can normally be reached on M - F (8:30 - 5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mancuso Joseph can be reached on (571) 272-7695. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

CLL

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PRIMARY EXAMINER